

Patent Claims

1. A pumping device for delivering and metering medical fluids in particular, comprising

a piston unit having a driving device (1) and a piston(7),

a membrane unit (14) having at least a membrane (11) and a first chamber (13) bordered by the membrane (11) and

a hydraulic unit (9) having a space to accommodate a hydraulic fluid which is connected to the piston (7) of the piston unit and to the first chamber (13) of the membrane unit (14),

characterized in that

provision is made for a control unit for controlling a predefinable metering rate and/or quantity, as well as for a measuring device (8) which can be connected to the control unit and by means of which the axial position of the piston (7) of the piston unit can be determined directly.

2. The pumping device according to Claim 1, characterized in that the piston (7) has a piston head and a piston shaft, and the measuring device (8) is arranged so that the axial position of the piston shaft can be determined.

3. The pumping device according to Claim 1 or 2, characterized in that the measuring device (8) has optical and/or electronic sensors.

4. The pumping device according to one or more of Claims 1 through 3, characterized in that a head piece can be connected detachably to the membrane unit (14) so that a second chamber is arranged on the side of the membrane opposite the first

chamber (13) is formed, with the membrane head having at least one inlet and at least one outlet.

5. The pumping device according to Claim 4, characterized in that the second chamber is directly adjacent to the membrane (11) of the membrane unit (14) when the membrane pump head is in the mounted state.

6. The pumping device according to Claim 4, characterized in that the second chamber is bordered by a membrane which is directly adjacent to the membrane (11) of the membrane unit (14) when the membrane pump head is in the mounted state.

7. The pumping device according to one of the preceding claims, characterized in that the membranes are in airless contact with one another.

8. The pumping device according to one or more of Claims 4 through 6, characterized in that the inlet and/or outlet of the membrane pump head can be blocked off.

9. The pumping device according to one or more of Claims 4 through 8, characterized in that the head piece is designed as a disposable part for one-time use.

10. The pumping device according to one or more of Claims 1 through 9, characterized in that a pressure sensor (10) is provided and is connected to the space of the hydraulic unit.

11. The pumping device according to Claim 10, characterized in that the pressure sensor (10) can be connected to the driving device (1) of the piston unit by a computer or motor controller.

12. The pumping device according to one or more of Claims 1 through 11, characterized in that the driving device (1) of the piston unit includes a linear drive.

13. The pumping device according to Claim 12, characterized in that the linear drive is formed by a rack and pinion.

14. The pumping device according to one or more of Claims 1 through 13, characterized in that the hydraulic unit has a vent valve (12).

15. The pumping device according to one or more of Claims 1 through 14, characterized in that a computing unit is provided, that is connected to the measuring device (8) and/or the control unit and is responsible for performing the metering, flow rate adjustment and thus also the balancing of the pumped media.

16. The pumping device according to Claim 15, characterized in that the computing unit is integrated into the control unit.

17. The pumping device according to one or more of Claims 1 through 16, characterized in that the piston unit is arranged on a chassis (15).

18. The pumping device according to one or more of Claims 1 through 17, characterized in that the membrane (11) of the membrane unit (14) has two membrane layers (11', 11'') each made of a non-stretching material and an interspace (20) extending between the two membrane layers (11', 11'') and filled with an incompressible medium so that the membrane layers (11', 11'') has an outward bulge with respect to the interspace (20).

19. The pumping device according to Claim 18, characterized in that the membrane layers (11', 11'') are arranged so that they are separated from one another by a spacer (70).